



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/812,602	03/30/2004	Shinichiro Nohdo	9792909-5846	3173

26263 7590 04/24/2007
SONNENSCHN NATH & ROSENTHAL LLP
P.O. BOX 061080
WACKER DRIVE STATION, SEARS TOWER
CHICAGO, IL 60606-1080

EXAMINER

SLOMSKI, REBECCA

ART UNIT	PAPER NUMBER
----------	--------------

2877

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/24/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/812,602

Applicant(s)

NOHDO, SHINICHIRO

Examiner

Rebecca C. Slomski

Art Unit

2877

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 3/9/07.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 01/23/07.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

Upon reconsideration, the examiner is of the opinion that the requirement for restriction made in the office action dated 10/27/06 is improper in whole. The requirement for restriction is withdrawn in whole, and claims 9-20 have been rejoined. Therefore, contained herein is an action on the merits of all the claims directed to the elected invention and any invention rejoined with the elected invention.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

- (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
- (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1 – 10, 12-16, and 18-20 are rejected under 35 U.S.C. 102(b) as being anticipated by Miyatake (U. S. Patent # 6,046,508).

1. With respect to claims 1 and 6, Miyatake discloses position detecting marks comprising:

- Alignment marks on an exposure surface, the alignment marks having edges for scattering inspection light for alignment during an exposure (Col.4, L 27-34)

- The alignment mark is configured to have a plurality of dot pattern groups, each of the dot pattern groups being projections from the exposure surface and configured to have a plurality of dot patterns arrayed in a predetermined direction (Col.4, L 22-23, Figure 2C, Figure 15A)
- The plurality of dot pattern groups are arrayed in the predetermined direction with an interval between the dot patterns groups, the interval being wider than an interval between the dot patterns (Figure 2C, Figure 15A)

2. With respect to claim 9, Miyatake discloses a position detecting method comprising:

- Radiating inspection light for alignment to a surface of wafer in such a way that the inspection light is incident on an alignment mark in a surface of the wafer and scattered therein before exposure with an exposure mask (Col.2, L 8-21)
- Wherein the exposure mask has alignment marks, the alignment marks being configured to have a plurality of dot pattern groups, each of the dot pattern groups being configured to have a plurality of dot patterns arrayed in a predetermined direction, and the plurality of dot pattern groups being arrayed in the predetermined direction with an interval between the dot pattern groups, the interval being wider than an interval between the dot patterns (Col.4, L 22-23, Figure 2C, Figure 15A)
- The alignment mark of the wafer has a same pattern as that of the dot pattern of the exposure mask (Figure 2A, Col.5, L 51-53)

3. With respect to claim 15, Miyatake discloses a position detecting method comprising:

- Performing an alignment by causing scattering of inspection light for alignment at an alignment mark on a surface of an exposure mask (Abstract)
- Performing an exposure of a wafer via the exposure mask (Abstract)
- Wherein the exposure mask is configured to have alignment marks, the alignment marks being configured to have a plurality of dot pattern groups, each of the dot pattern groups being configured to have a plurality of dot patterns arrayed in a predetermined direction, and the plurality of dot pattern groups being arrayed in the predetermined direction with an interval between the dot pattern groups, the interval being wider than an interval between the dot patterns (Col.4, L 22-23, Figure 2C, Figure 15A)

4. With respect to claims 2, 12 and 18, Miyatake discloses all of the limitations as applied to claims 1, 9 and 15 above. In addition, Miyatake discloses:

- Dot pattern is formed by performing a proximity exposure (Col.1, L 15-16)

5. With respect to claim 3, Miyatake discloses all of the limitations as applied to claim 1 above.

In addition, Miyatake discloses:

- Dot pattern is a raised rectangular pattern (Col.5, L 45-47)

6. With respect to claims 4 and 7, Miyatake discloses all of the limitations as applied to claims 1 and 6 above. In addition, Miyatake discloses:

- Dot pattern formed in a plurality of rows in the predetermined direction (Figure 15A)
7. With respect to claims 5 and 8, Miyatake discloses all of the limitations as applied to claims 1 and 6 above. In addition, Miyatake discloses:
- Alignment marks are disposed at a plurality of portions in respective directions (Figure 2C)
8. With respect to claims 10 and 16, Miyatake discloses all of the limitations as applied to claims 9 and 15 above. In addition, Miyatake discloses:
- The inspection light for alignment is incident on the exposure mask and the wafer in an oblique direction (Col.4, L 27, Figure 1)
9. With respect to claims 13 and 19, Miyatake discloses all of the limitations as applied to claims 9 and 15 above. In addition, Miyatake discloses:
- The detecting of scattered inspection light is performed by differentiation processing of a signal strength along the arrangement direction of dot patterns (Col.9, L 24-37)
10. With respect to claim 14 and 20, Miyatake discloses all of the limitations as applied to claims 9 and 15 above. In addition, Miyatake discloses:
- Peaks of higher signal strength with stronger scattering of the inspection light are arranged periodically in the direction of arrayed dot pattern (Col.12, L 50-61)

Claims 1 and 3-8 are rejected under 35 U.S.C. 102(b) as being anticipated by Tominaga (U. S. Patent # 5,525,840).

1. With respect to claims 1 and 6, Tominaga teaches a system of alignment marks comprising:

- Alignment marks on an exposure surface, the alignment marks having edges for scattering inspection light for alignment during an exposure (Col.1, L 37-38)
- The alignment mark is configured to have a plurality of dot pattern groups, each of the dot pattern groups being projections from the exposure surface and configured to have a plurality of dot patterns arrayed in a predetermined direction (Col.5, L 53-64, Figure 6 in view of Figure 1A)
- The plurality of dot pattern groups are arrayed in the predetermined direction with an interval between the dot patterns groups, the interval being wider than an interval between the dot patterns (Figure 6)

11. With respect to claim 3, Tominaga discloses all of the limitations as applied to claim 1 above.

In addition, Tominaga discloses:

- Dot pattern is a raised rectangular pattern (Figure 10A, Figure 9B)

12. With respect to claims 4 and 7, Tominaga discloses all of the limitations as applied to claims

1 and 6 above. In addition, Tominaga discloses:

- Dot pattern formed in a plurality of rows in the predetermined direction (Figure 10A)

13. With respect to claims 5 and 8, Tominaga discloses all of the limitations as applied to claims 1 and 6 above. In addition, Tominaga discloses:

- Alignment marks are disposed at a plurality of portions in respective directions (Figure 10A)

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 11 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyatake U. S. Patent # 6,046,508 in view of Schulz U.S. Publication 2003/0044702.

14. With respect to claims 11 and 17, Miyatake discloses all of the limitations as applied to claims 9, 10, 15 and 16 above. However, Miyatake fails to disclose the inspection light is radiated onto the exposure surface in such a way that the plane of incidence of the inspection light is parallel to the arrangement direction of the dot pattern.

Schulz discloses semiconductor measuring device comprising:

- Inspection light is radiated onto the exposure surface in such a way that the plane of incidence of the inspection light is parallel to the arrangement direction of the dot pattern (P.0030)

It would have been obvious to one of ordinary skill in the art at the time the invention was conceived to use the parallel incident light of Schulz in the position detecting method of Miyatake since it would increase sensitivity along that direction. (Schulz, P.0030)

Response to Arguments

The following is in response to the arguments presented by the applicant in the response to the December 11, 2006 Office Action.

15. Applicant's arguments, see Page 6, Line 19, with respect to the rejection(s) of claim(s) 1, 4, 5, 6, 7, and 8 under 35 U.S.C. 102 anticipated by Tominaga, have been fully considered but are not persuasive.

Tominaga discloses Prior Art Figure 1A that clearly includes alignment marks as projections from the exposure surface. Prior Art Figure 1B is said to correspond to Figure 1A and Prior Art Figure 2A corresponds to Figure 1B. (Col.1, L 24-25, 59-61) Finally, Figures 6 and 10A are likened to the conventional Figure 2A. (Col.5, L 52-53, Col.8, L 1-2) Therefore, Tominaga's Figures 6 and 10A disclose the plurality of dot pattern groups from one view, these dot pattern groups being considered projections from the exposure surface like in the corresponding prior art figures.

16. Applicant's arguments, see Page 7, Line 18-21, with respect to the rejection(s) of claim(s) 1, 4, 6, and 7 under 35 U.S.C. 102 anticipated by Smith have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further

consideration, a new ground(s) of rejection is made in view of Miyatake, U.S. Patent #6,046,508.

17. Applicant's arguments, see Page 8, Line 15-17 and Line 21-23, with respect to the rejection of claims 2 and 3 have been fully considered and are persuasive. The rejection of claims 2 and 3 has been withdrawn. However, upon further consideration, new grounds of rejection are made in view of Miyatake, U.S. Patent #6,046,508 and Tominaga U.S. Patent #5,525,840.

Citation

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- Holloway et al. discloses an alignment mark structure comprising rectangular raised surfaces wherein a plurality of segments forms a bass pattern.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rebecca C. Slomski whose telephone number is 571-272-9787. The examiner can normally be reached on Monday through Thursday, 7:30 am - 5:00 pm EST.

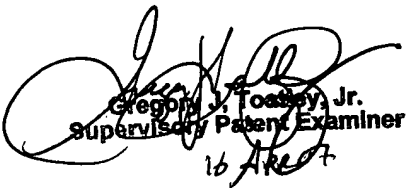
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory J. Toatley, Jr. can be reached on 571-272-2059. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

RCS

Rebecca C. Slomski
Assistant Patent Examiner

RCS


Gregory J. Tooley, Jr.
Supervisory Patent Examiner
16 APR 07